Charactrization of Fluorescent Proteins In Marine Organisms

Dr. Michael P. Lesser
University of New Hampshire
Department of Zoology and Center for Marine Biology
Durham, NH 03824
phone: (603) 862-3442 fax: (603) 862-3784e-mail: mpl@christa.unh.edu

Award #N00140210248

LONG-TERM GOAL

My principal goal is to understand the function, evolution, and taxonomic distribution of flourescent proteins in marine organisms. Several hypotheses have been postulated regarding the function of these ubiquitous proteins including protection from the damaging effects of ultraviolet radiation and the augmentation of photosynthesis by fluorescent resonance energy transfer. I hope to be able to ascertain the function of these proteins and provide new data to answer these important questions.

OBJECTIVES

This project is directed at understanding the optical properties of coastal benthic communities in general, and in particular, coral reefs. Coral reefs have been a focus of study on fluorescent proteins and almost all corals examined to date contain one or more of these compounds. The role of green fluorescent protein (GFP) in the ecology of marine organisms and the potential commercial utility of these, and other, fluorescent proteins is presently undergoing a renaissance of interest as more fluorescent proteins are identified in the marine environment. The scientific objectives of my project are:

1. to make comprehensive taxonomic collection of marine organisms in tropical, temperate, polar, and deep sea environments to examine various taxa for fluorescent proteins.
2. to understand the evolutionary relationship between fluorescent proteins of different taxa
3. to understand the function of fluorescent proteins in those taxa expressing them
4. to understand what environmental variables affect the expression of fluorescent proteins in those taxa expressing them

APPROACH

The approach is is similar to that taken for two scleractinian corals from the Bahamas; *Montastraea faveolata* and *Montastraea cavernosa*. Collections are made and samples archived for biophysical and molecular analyses of the fluorescent proteins. Differential expression of these proteins under different environmental conditions will also be examined (see Fig. 1 for example of different GFP concentrations with depth).

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
30 SEP 2002		**00-00-2002 to 00-00-2002**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Charactrization of Fluorescent Proteins In Marine Organisms	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **University of New Hampshire,,Department of Zoology and Center for Marine Biology,,Durham,,NH, 03824**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT
My principal goal is to understand the function, evolution, and taxonomic distribution of flourescent proteins in marine organisms. Several hypotheses have been postulated regarding the function of these ubiquitous proteins including protection from the damaging effects of ultraviolet radiation and the augmentation of photosynthesis by fluorescent resonance energy transfer. I hope to be able to ascertain the function of these proteins and provide new data to answer these important questions.

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**4**	

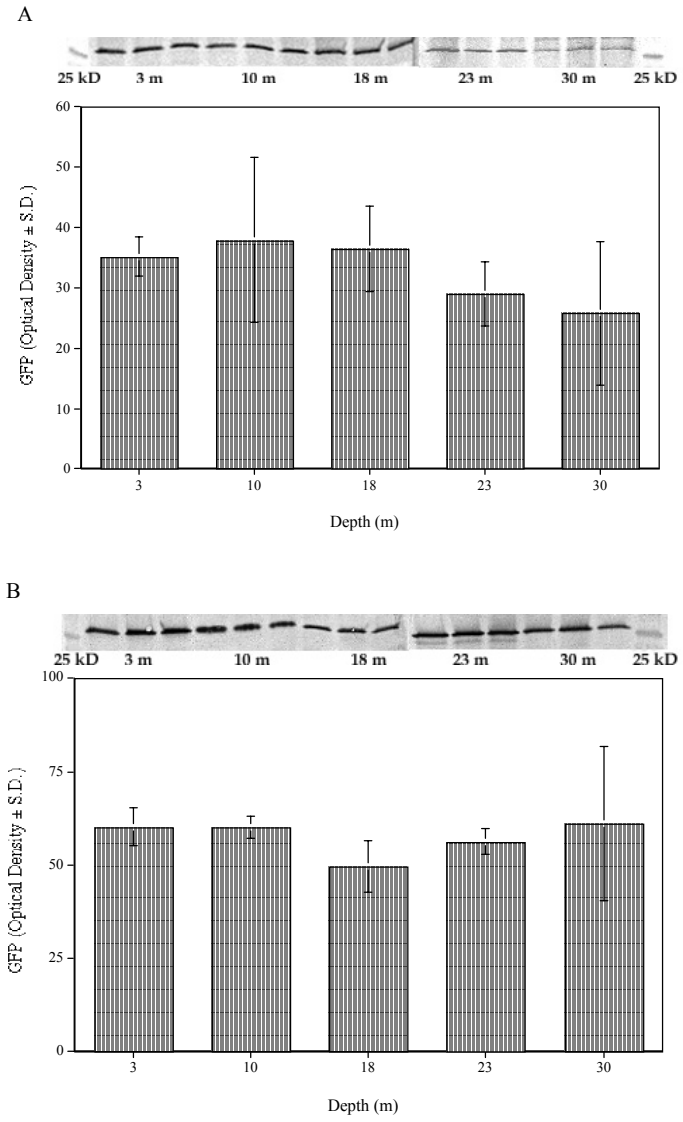

Figure 1. Bathymetric westerns against GFP for Montastraea faveolata and Montastraea cavernosa. A) Optical density (± SD) of immunoblots for GFP from field samples of M. faveolata. B) Optical density (± SD) of immunoblots for GFP from field samples of M. cavernosa. No significant effect of depth was detected for either species.

WORK COMPLETED

Extensive collections of marine organisms have been made in the Bahamas down to a depth of 300 fsw. Additional collections have been made in the Gulf of Maine and Hawaii and are planned for Antarctica, hydrothermal vents, and the Pacific Northwest. We have begun to isolate RNA from these samples to synthesize cDNA and eventually sequence fluorescent protein genes.

RESULTS

This project is in the early stages but initial results suggest the presence of fluorescent proteins in non-tropical environments with extremely low light levels and without symbionts. This again begs the question of function which will continue to be investigated.

IMPACT/APPLICATIONS

In addition to understanding the evolution and function of these proteins there is the possibility of discovering new fluorescent proteins with spectral properties desired by the biotechnology community and therefore the potential for commercialization exists.

TRANSITIONS

No data from the is project is presently being used by others.

RELATED PROJECTS

Charlie Mazel-ONR, CoBOP

PUBLICATIONS

None